

The claimed invention is:

1. A catalyst composition comprising a complex of catalytic oxides comprising rubidium, cerium, chromium magnesium, iron, bismuth, molybdenum, and at least one of nickel or nickel and cobalt, wherein the relative ratios of these elements are represented by the following general formula



wherein A is Ni or the combination of Ni and Co,

a is about 0.01 to about 1,

b is about 0.01 to about 3,

c is about 0.01 to about 2,

d is about 0.01 to about 7,

e is about 0.01 to about 10,

f is about 0.01 to about 4,

g is about 0.05 to about 4,

x is a number determined by the valence requirements of the other elements present,

wherein "b" + "c" is greater than g and wherein the catalyst is substantially free of manganese, a noble metal and vanadium.

2. The catalyst composition of claim 1, wherein b is less than c.

3. The catalyst composition of claim 1 wherein the catalyst comprises phosphorus.

4. The catalyst composition of claim 1 wherein the catalyst comprises at least one of potassium, cesium, sodium, or mixtures thereof.

5. The catalyst composition of claim 1, wherein the catalyst composition comprises a support selected from the group consisting of silica, alumina, zirconium, titania, or mixtures thereof.

6. The catalyst composition of claim 5, wherein the support comprises about 30 and 70 weight percent of the catalyst.

7. The catalyst composition of claim 1, wherein the catalyst composition comprises silica having an average colloidal particle size in between about 8 nm and about 100 nm.

8. A catalyst composition comprising a complex of catalytic oxides comprising rubidium, cerium, chromium, iron, bismuth, molybdenum, and at least one of nickel or nickel

and cobalt, optionally magnesium, and optionally one of phosphorus, antimony, tellurium, sodium, lithium, potassium, cesium, thallium, boron, germanium, tungsten calcium, wherein the relative ratios of these elements are represented by the following general formula:



- 5 wherein A is Ni or the combination of Ni and Co,
 Y is at least one of P, Sb, Te, Li, Na, K, Cs, Tl, B, Ge, W,
 Ca, Zn, a rare earth element, or mixtures thereof,
 a is about 0.01 to about 1,
 b is about 0.01 to about 3,
 10 c is about 0.01 to about 2,
 d is 0 to about 7,
 e is about 0.01 to about 10,
 f is about 0.01 to about 4,
 g is about 0.05 to about 4,
 15 h is 0 to about 3,
 x is a number determined by the valence requirements of the other elements present,

wherein "b" + "c" is greater than "g", and wherein the catalyst is substantially free of manganese, a noble metal or vanadium.

- 20 9. The catalyst composition of claim 8, wherein b is less than c.
 10. The catalyst composition of claim 8, wherein d is about 0.01 to about 7.0.
 11. The catalyst composition of claim 8, wherein the catalyst comprises phosphorus.
 12. The catalyst composition of claim 8, wherein the catalyst comprises at least one
 25 of potassium, cesium, sodium, or mixtures thereof.
 13. The catalyst composition of claim 8, wherein the catalyst composition comprises a support selected from the group consisting of silica, alumina, zirconium, titania, or mixtures thereof.
 14. The catalyst composition of claim 13, wherein the support comprises about 30
 30 to about 70 weight percent of the catalyst.
 15. The catalyst composition of claim 8, wherein the catalyst composition comprises silica having an average colloidal particle size in between about 8 nm and about 100 nm.

16. A process for the conversion of an olefin selected from the group consisting of propylene, isobutylene or mixtures thereof, to acrylonitrile, methacrylonitrile, and mixtures thereof, respectively, by reacting in the vapor phase at an elevated temperature and pressure said olefin with a molecular oxygen containing gas and ammonia in the presence of a catalyst comprising a complex of catalytic oxides comprising rubidium, cerium, chromium, iron, bismuth, molybdenum, and at least one of nickel or nickel and cobalt, optionally magnesium, and optionally one of phosphorus, antimony, tellurium, sodium, lithium, potassium, cesium, thallium, boron, germanium, tungsten calcium, wherein the relative ratios of these elements are represented by the following general formula:



wherein A is Ni or the combination of Ni and Co,
Y is at least one of P, Sb, Te, Li, Na, K, Cs, Tl, B, Ge, W,
Ca, Zn, a rare earth element, or mixtures thereof,
a is about 0.01 to about 1,
b is about 0.01 to about 3,
c is about 0.01 to about 2,
d is 0 to about 7,
e is about 0.01 to about 10,
f is about 0.01 to about 4,
g is about 0.05 to about 4,
h is 0 to about 3,
x is a number determined by the valence requirements of the other elements present,

wherein "b" + "c" is greater than g, and wherein the catalyst is substantially free of manganese, a noble metal or vanadium.

17. The process of claim 16, wherein b is less than c.

18. The process of claim 16, wherein d is about 0.01 to about 7.0.

19. The process of claim 16, wherein h is 0.

20. The process of claim 16, wherein the catalyst comprises phosphorus.

21. The process of claim 16, wherein the catalyst comprises at least one of potassium, cesium, sodium, or mixtures thereof.

22. The process of claim 16, wherein the catalyst composition comprises a support selected from the group consisting of silica, alumina, zirconium, titania, or mixtures thereof.

23. The process of claim 22, wherein the support comprises between 30 and 70 weight percent of the catalyst.

24. The process of claim 16, wherein the catalyst composition comprises silica having an average colloidal particle size in between about 8 nm and about 100 nm.